Climate change risks for rail in Europe

Conference on Rail Resilience

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Supporting sustainability policy through knowledge

- An independent **EU agency**
- Analysing, assessing and providing **information**
- An interface between **science and policy**
- Dependent upon **strong networks** to carry out its work

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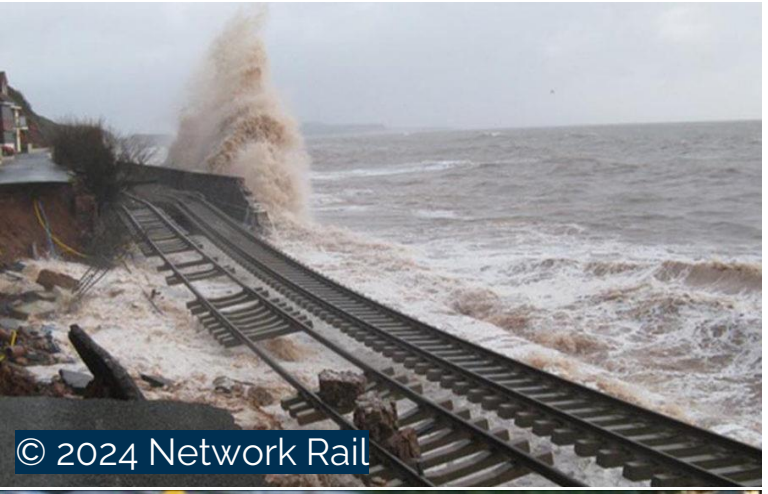
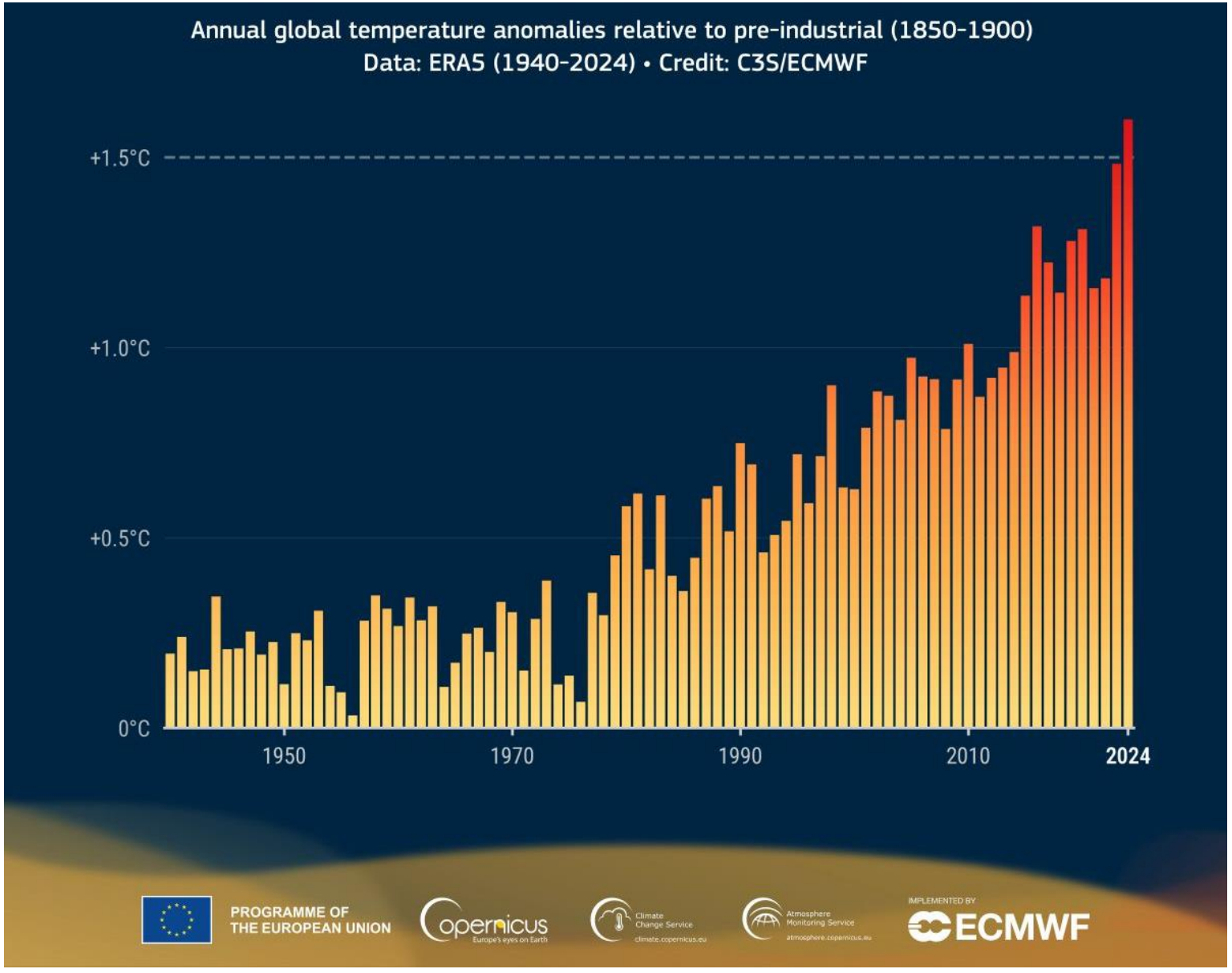
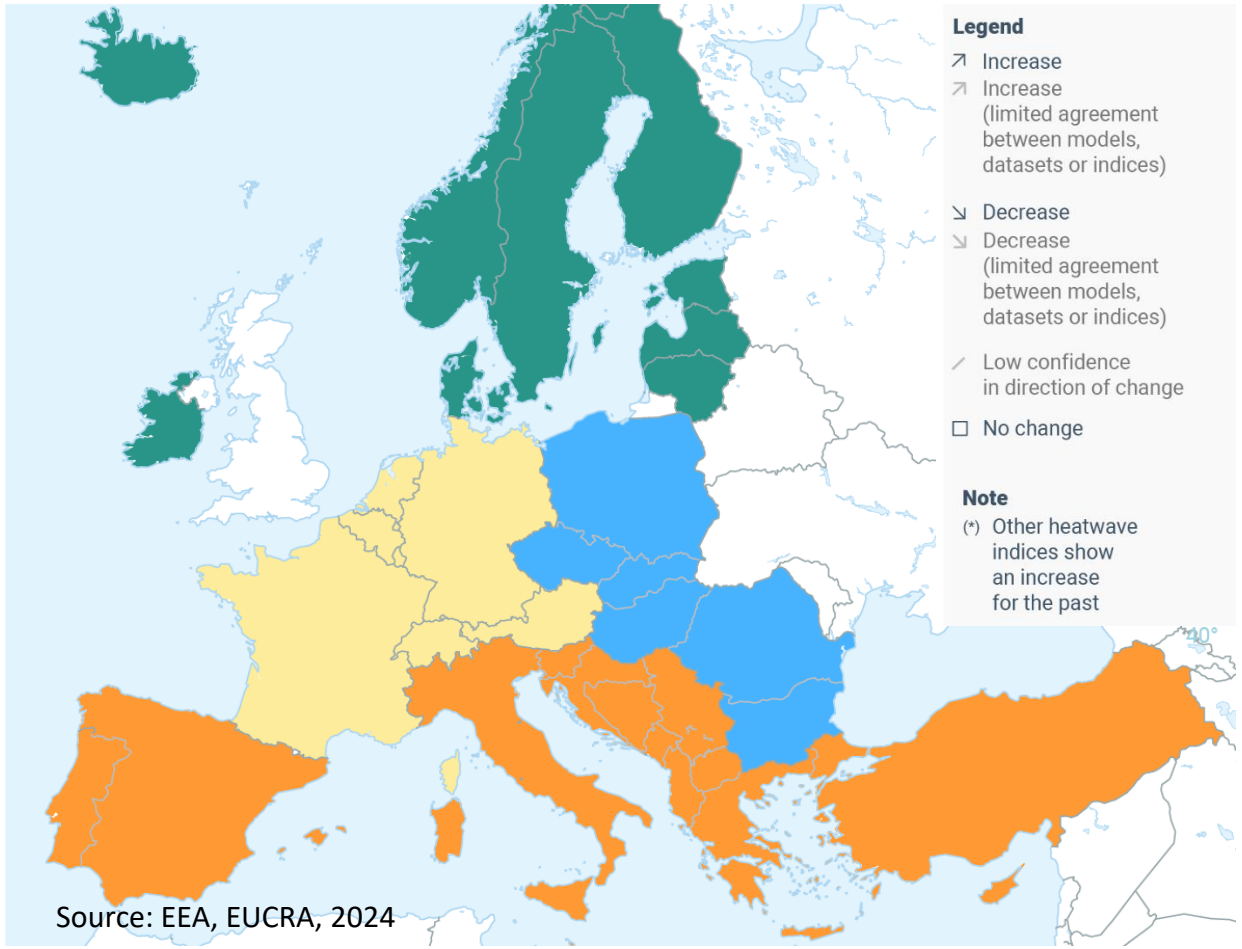
Global climate change and associated risks: our current reality



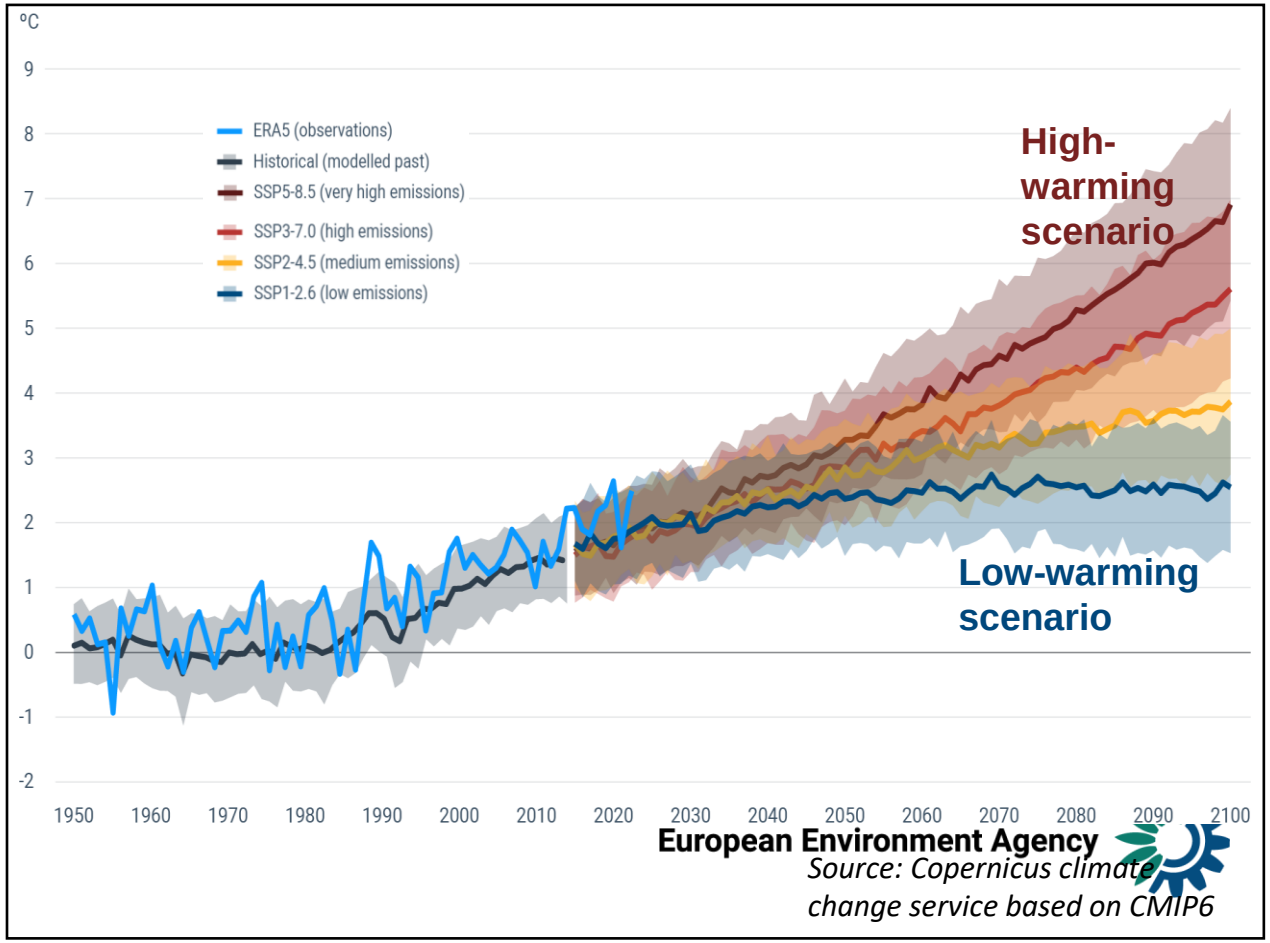


All Europe's regions will experience increasing climatic risk drivers incl. heatwaves, heavy precipitation and drought



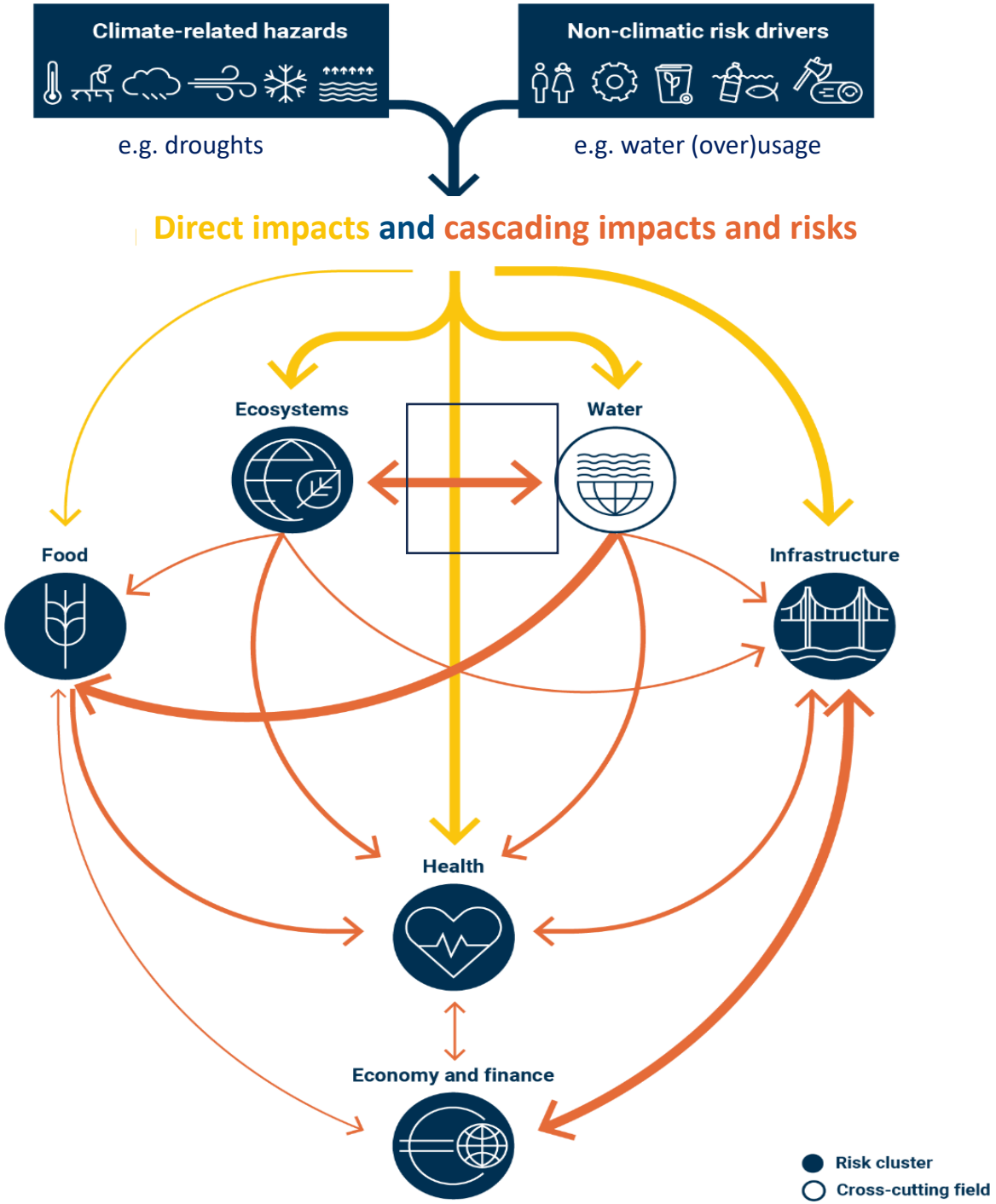
Source: EEA, EUCRA, 2024

Land regions	Northern Europe			Western Europe			Central-eastern Europe			Southern Europe		
	Past	Future		Past	Future		Past	Future		Past	Future	
		Low	High		Low	High		Low	High		Low	High
Mean temperature	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Heatwave days	☐(*)	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Total precipitation	↗	↗	↗	↗	⟋	↘	↗	↗	⟋	↘	↘	↘
Heavy precipitation	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Drought	↗	↘	↘	↗	⟋	↗	↗	⟋	↗	↗	↗	↗



Source: Copernicus climate change service based on CMIP6

Climate risks can cascade across societal systems



- Climate risks can cascade across systems, leading to unexpected impacts
- Systemic approach to adaptation and preparedness required

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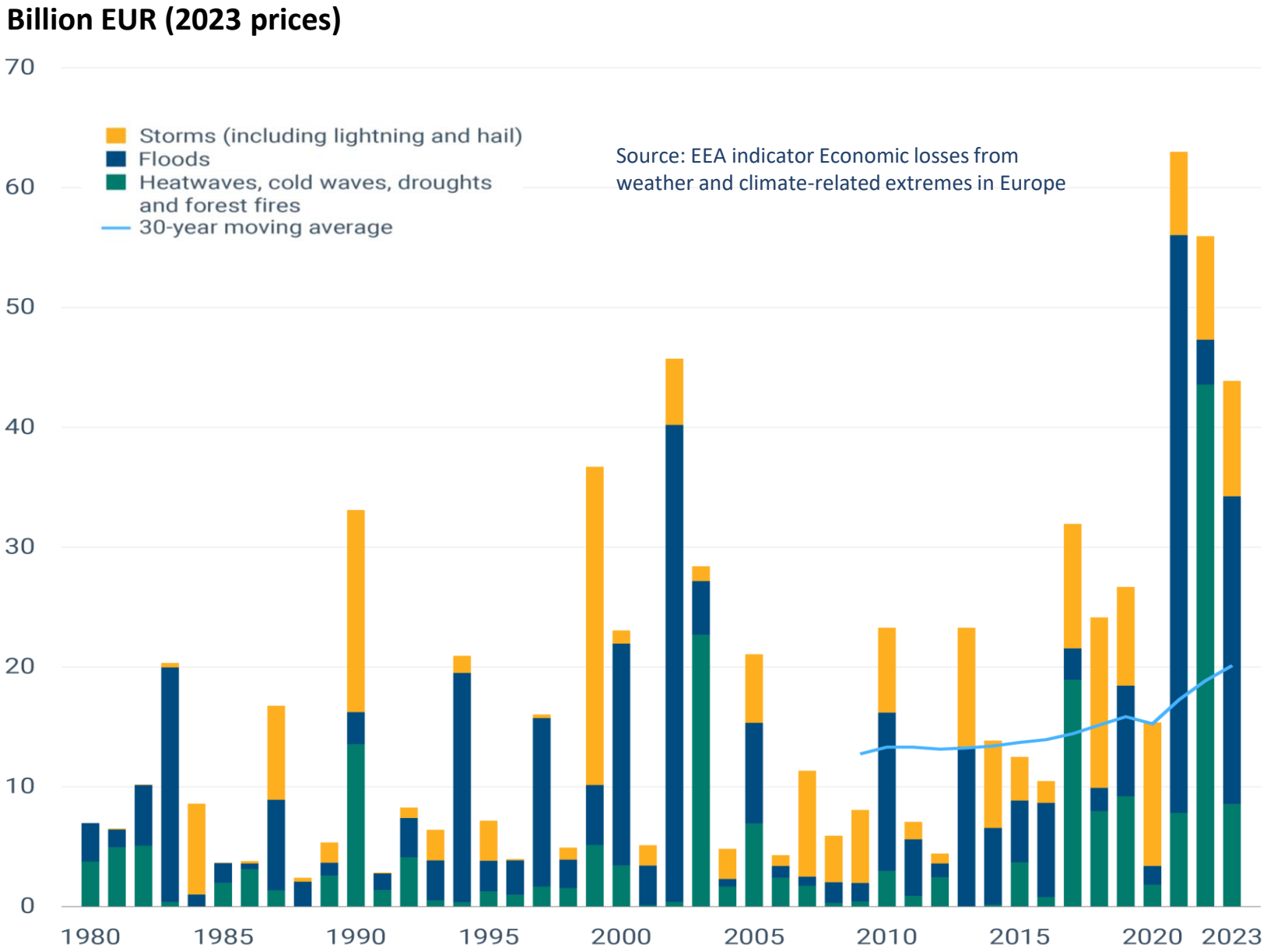
Extreme weather 1980-2023: economic losses on the rise



EU27, 1980-2023:
EUR 738 billion in economic losses

2021: EUR 64b (40 b floods BE/NL/DE)

2022: EUR 57b (forest fires, droughts, heat waves)

2023: EUR 44b (floods, forest fires, droughts)

2024: first estimates already +EUR 30b (Valencia and Central Europe floods)

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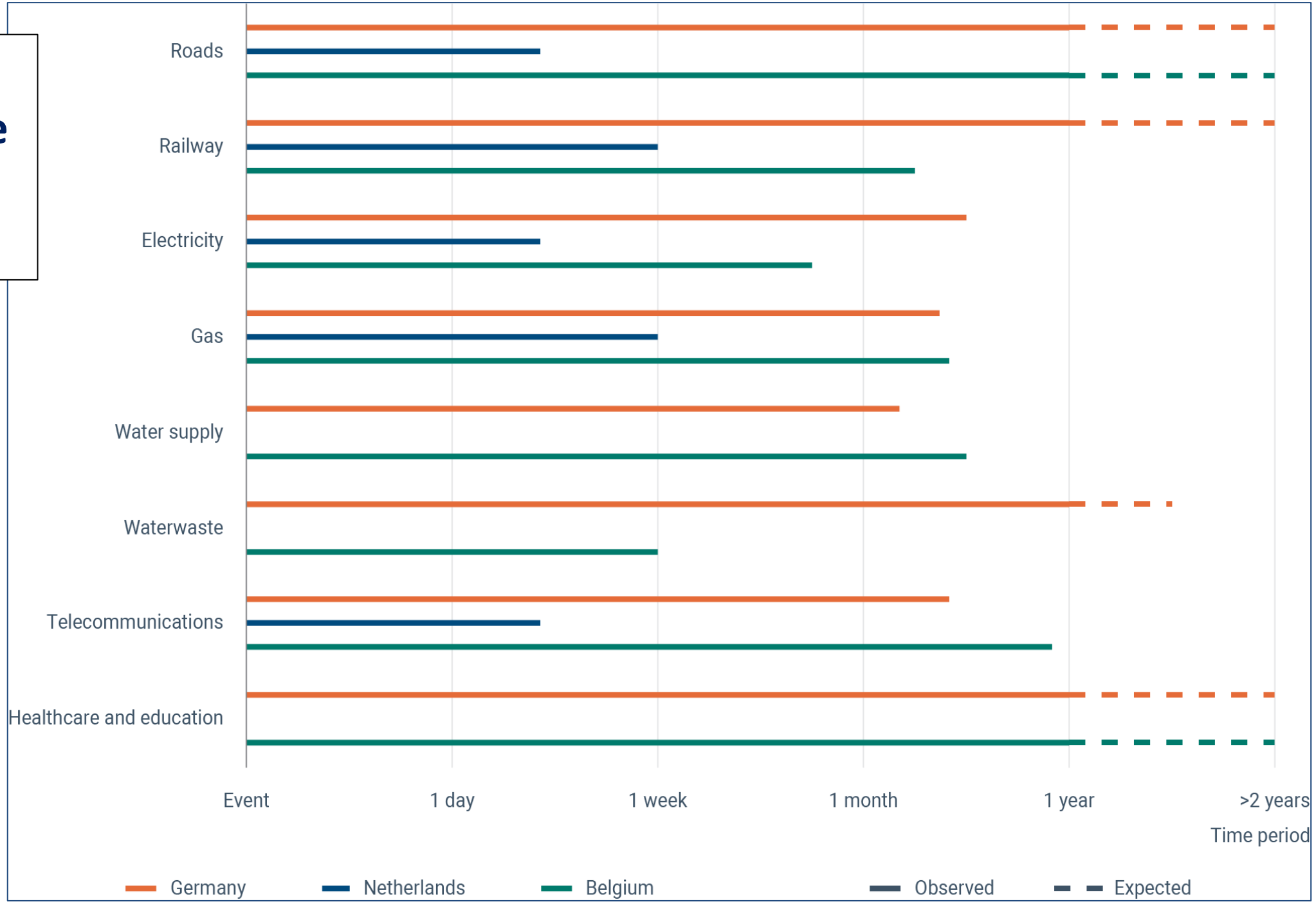
Long infrastructure recovery times



Infrastructure recovery after 2021 floods Belgium, Germany, Netherlands

EUCRA, based on Koks et al., 2022

Priorities for EU policy on climate adaptation

EUCRA evaluates the urgency of major climate risks for Europe

Climate risks for 'Infrastructure' cluster	Urgency to act	Risk severity			Policy characteristics		
		Current	Mid-century	Late century (low/high warming scenario)	Policy horizon	Policy readiness	Risk ownership
Pluvial and fluvial flooding	Urgent action needed	+++	+++	++	Long	Medium	Co-owned
Coastal flooding	More action needed	+++	+++	+++	Long	Advanced	Co-owned
Damage to infrastructure and buildings (*)	More action needed	++	++	++	Long	Medium	Co-owned
Energy disruption due to heat and drought (hotspot region: southern Europe)	More action needed	++	++	++	Medium	Medium	Co-owned
Energy disruption due to heat and drought	Further investigation	++	++	+	Medium	Medium	Co-owned
Energy disruption due to flooding	Further investigation	++	++	++	Long	Advanced	Co-owned
Marine transport	Further investigation	++	++	++	Medium	Medium	Co-owned
Land-based transport	Further investigation	++	++	++	Medium	Medium	Co-owned

Legends and notes

Urgency to act
- Urgent action needed
- More action needed
- Further investigation
- Sustain current action
- Watching brief

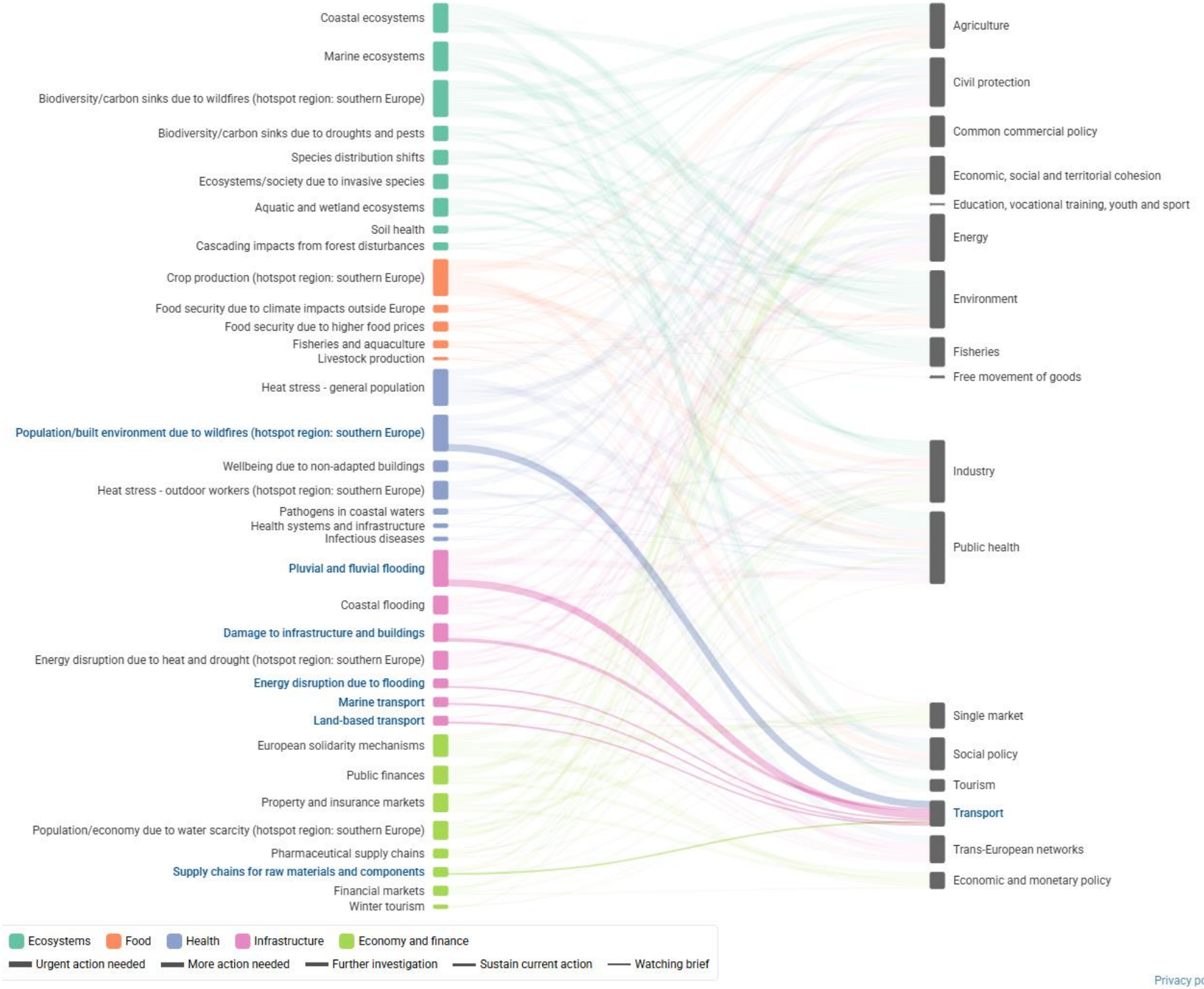
Risk severity
- Catastrophic
- Critical
- Substantial
- Limited

Confidence

Low: +
Medium: ++
High: +++

(*) Urgency based on high warming scenario (late century).

EU transport policy area exposed to multiple climate risks



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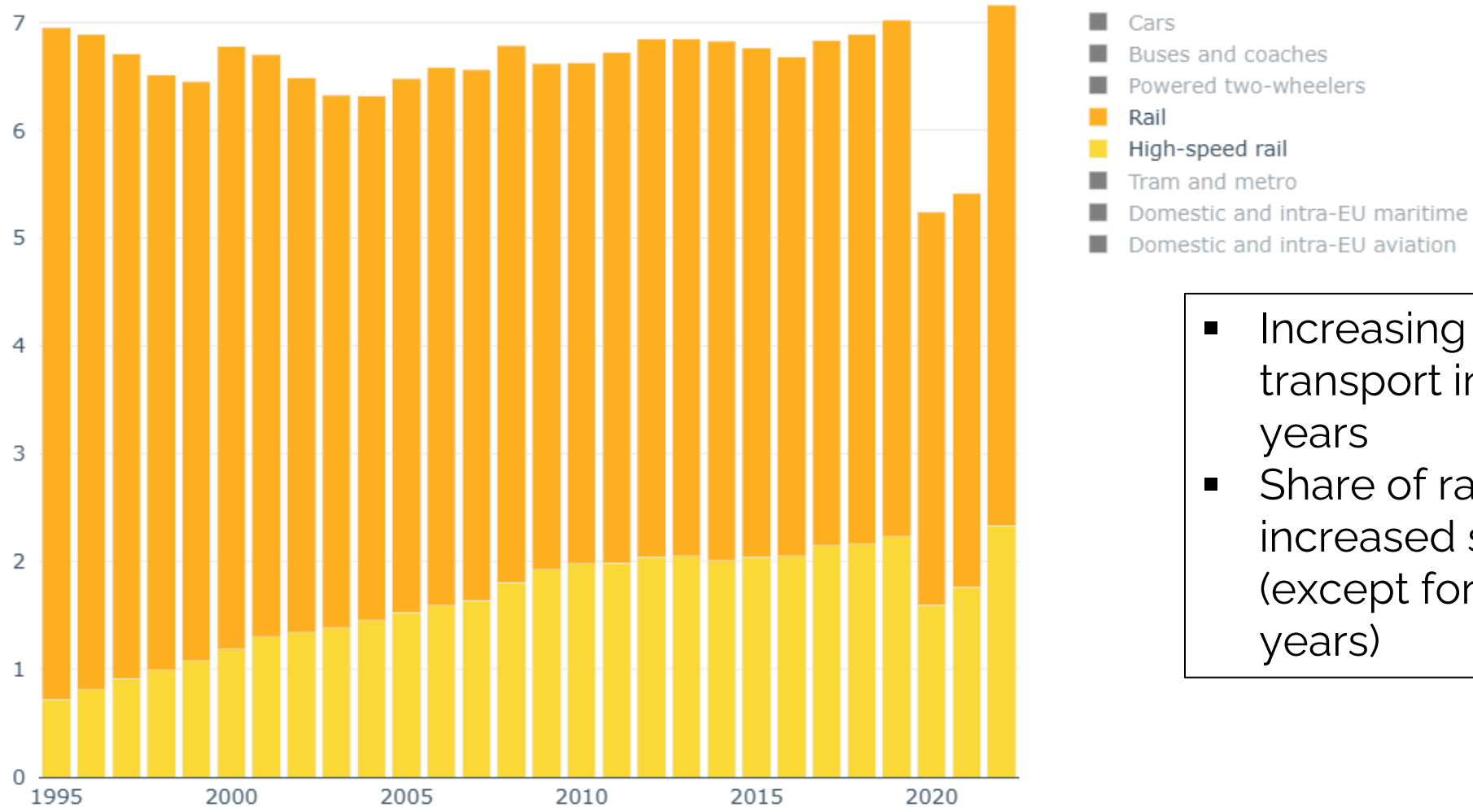
EUCRA: main takeaways for rail

- **Comprehensive and structured** risk assessment
- **Data** on hazards, exposure, vulnerability for appropriate **solutions**
- **Land-based transport** major climate risk
- **Cascading** nature of risks
- Increase **resilience** of rail infrastructure on systems level
- **Societal preparedness is lagging behind** the fast increase in major climate risks
- **Climate adaptation policies** need to consider multiple policy objectives together
- Climate risks are **co-owned** by the EU and its Member States
- **Stronger EU policy action is urgently needed** to manage several major climate risks

Rail as enabler of sustainable transformation

Passenger transport for rail and high-speed rail
(share of total passenger transport)



- Increasing passenger transport in last 27 years
- Share of rail transport increased slightly (except for COVID-years)

Rail as enabler of sustainable transformation

- Public & private investment in innovation and infrastructure
- Implementation of EU legislation to increase demand
- Promoting shift
- High-speed rail from **32.5** billion passenger-km in 1995 to **134** billion passenger-km in 2019

Adapting to climate change in transport

Climate ADAPT
SHARING ADAPTATION KNOWLEDGE FOR A CLIMATE-RESILIENT EUROPE

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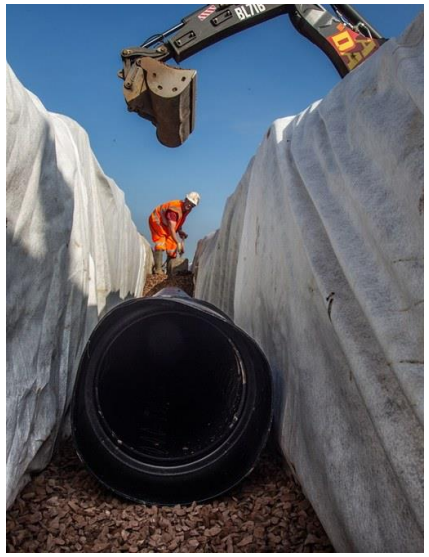
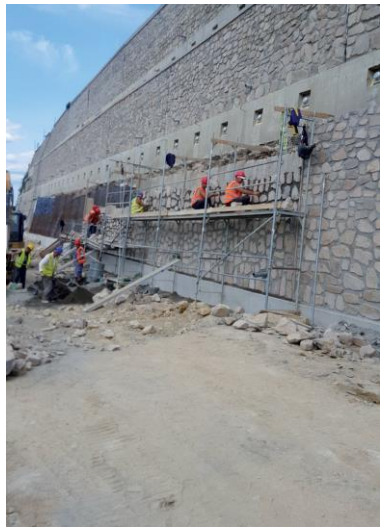
EU Policy > Adaptation in EU policy sectors > Transport

Implementing climate change allowances in drainage standards across the UK railway network





Incorporating climate change risks in planning the modernization of the railway corridor in Slovakia

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Thank you

Contact us:
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